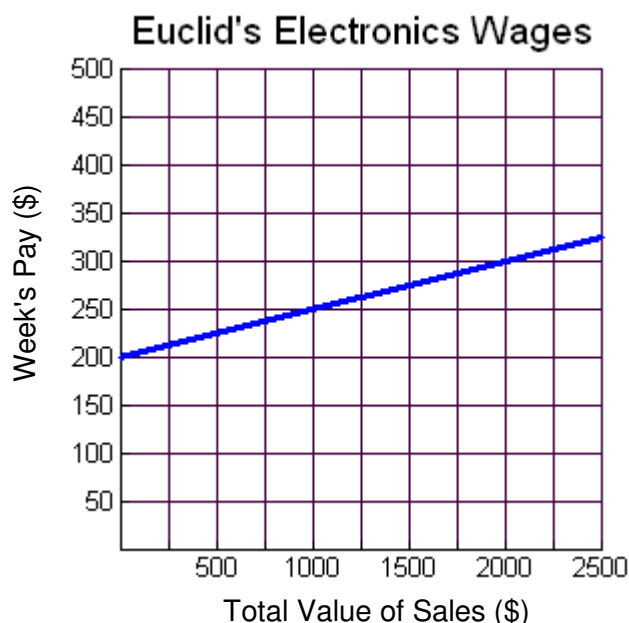


4.1.1: Working on Commission

Nahid works at Euclid's Electronics. She is paid a salary of \$200 per week plus a commission of 5% of her sales during the week.

The equation $P = 0.05s + 200$, represents Nahid's pay for the week where P represents the total pay for the week and s represents her total sales.

If Nahid earned **\$290** in a week use the equation to algebraically determine how much she sold.

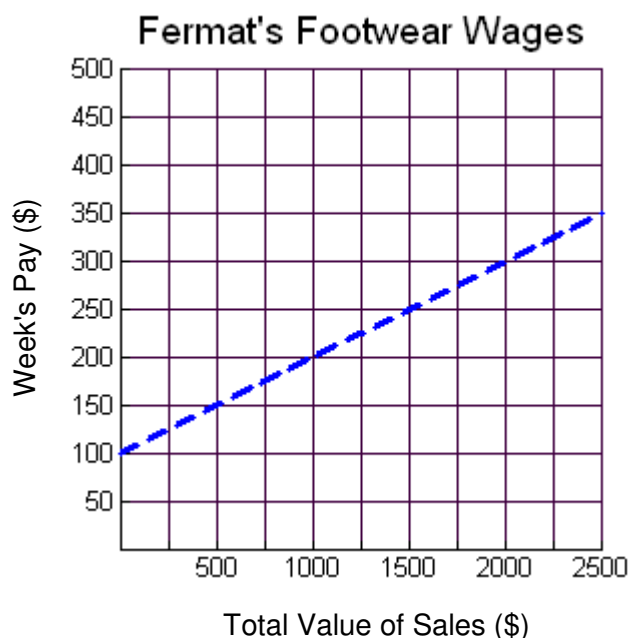


Nahid is offered another job at Fermat's Footwear, where the pay is a salary of \$100 per week and 10% commission on all sales. The graph below represents the **Pay vs. Sales** for this job.

Which of the following equations do you think represents pay for one week at Fermat's Footwear?

- a) $P = 0.01s + 100$
- b) $P = 0.10s + 100$
- c) $P = 100s + 10$
- d) $P = 0.05s + 200$

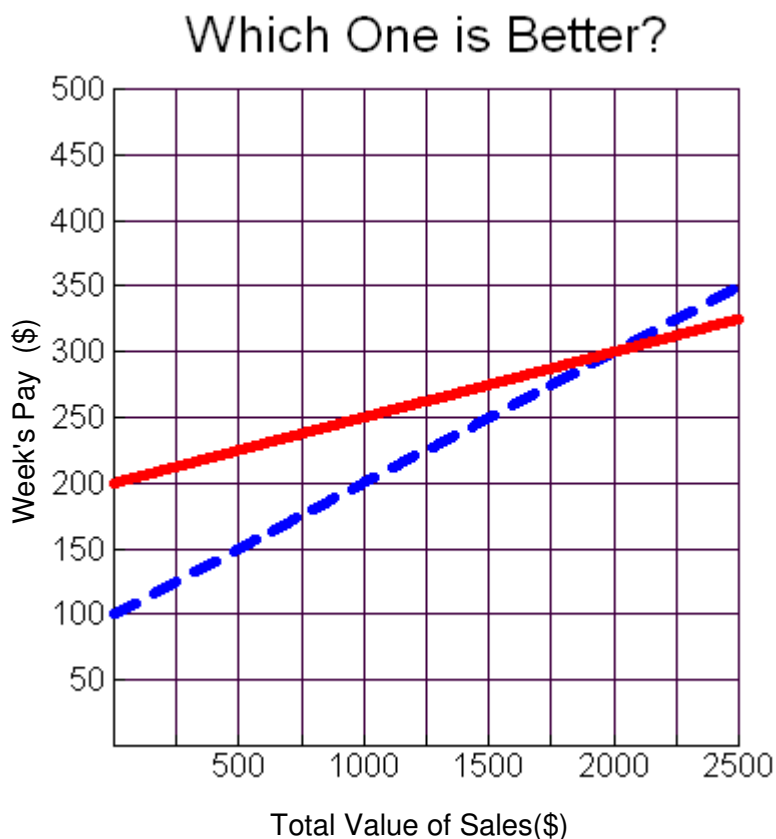
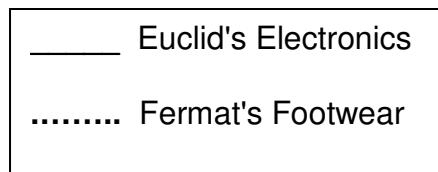
Provide a reason or justify why you selected the equation that you chose. Refer back to the equation for Euclid's Electronics for hints.



4.1.1: Working on Commission (Continued)

Nahid needs help determining which job she should keep. She decides to look at them as a **system of equations** when she creates a graph comparing the two equations at the same time.

Analyze the graph and complete the questions below.



1. Where the two lines cross is called the **point on intersection**, or the **solution to the system**. At what coordinates do the two lines cross?
2. What does this coordinate represent in terms of Nahid's sales, and pay for the week?
3. If Nahid usually makes \$1500 worth of sales per week, which job should she take? Explain.
4. How does the graph help Nahid determine which is the better job?
5. What does the point (1000, 250) represent in the graph?

4.1.2: What's My Equation?

You are given four problems below. Each problem will require two equations to solve it. The equations that are needed to solve each problem appear at the bottom of the handout. Match the equations with the problems and compare your answers with another student.

Note: There are more equations than problems and all the equations use x for the independent variable and y for the dependent variable.

Problem A:

Equations

The yearbook club is considering two different companies to print the yearbook. The Descartes Publishing Company charges a flat fee of \$450 plus \$5.00 per book. School Memories charges a flat fee of \$700 plus \$4.00 per book. Which company should the yearbook club select to print this year's yearbook?

Problem B:

Equations

The school council is trying to determine where to hold the athletic banquet. The Algebra Ballroom charges an \$800 flat fee and \$60 per person. The Geometry Hall charges a \$1000 flat fee and \$55 per person. Which location should the school council select for the athletic banquet?

Problem C:

Equations

Yasser is renting a car. Zeno Car Rental charges \$45 for the rental of the car and \$0.15 per kilometre driven. Erdos Car Rental charges \$35 for the rental of the same car and \$0.25 per kilometre driven. Which company should Yasser choose to rent the car from?

Problem D:

Equations

The school is putting on the play "Algebra: The Musical". Adult tickets were sold at a cost of \$8 and student tickets were sold at a cost of \$5. A total of 220 tickets were sold to the premiere and a total of \$1460 was collected from ticket sales. How many adult and student tickets were sold to the premiere of the musical?

EQUATIONS:

- | | | | |
|----------------------|-----------------------|----------------------|----------------------|
| 1. $y = 4.50 + 475x$ | 2. $60 + 800x = y$ | 3. $y = 1000 + 55x$ | 4. $x = 45 + 0.15x$ |
| 5. $y = 1000x + 55$ | 6. $y = 45 + 0.15x$ | 7. $x + y = 220$ | 8. $5x + 8y = 220$ |
| 9. $y = 4.00x + 700$ | 10. $y = 550x + 4.25$ | 11. $y = 800 + 60x$ | 12. $x + y = 1460$ |
| 13. $y = 0.25x + 35$ | 14. $y = 5.00x + 450$ | 15. $y = 35x + 0.25$ | 16. $5x + 8y = 1460$ |

4.1.2: What's My Equation? (Continued)

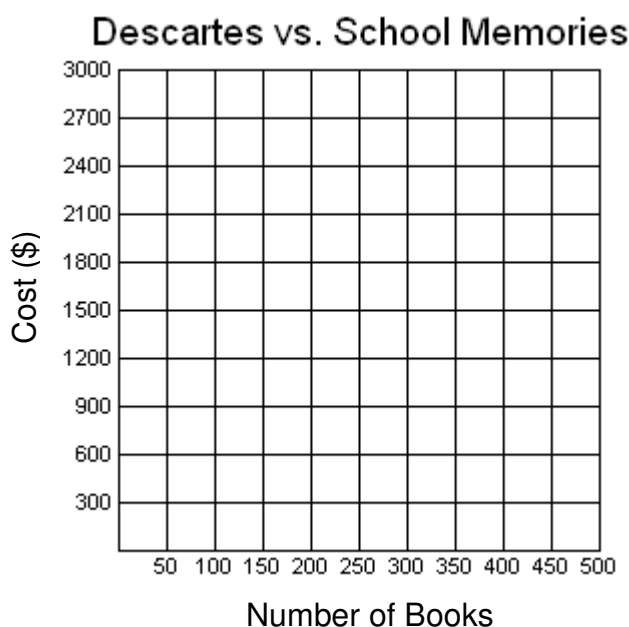
Problem A:

The yearbook club is considering two different companies to print the yearbook. The Descartes Publishing Company charges a flat fee of \$450 plus \$5.00 per book. School Memories charges a flat fee of \$700 plus \$4.00 per book. **Which company should the yearbook club select to print this year's yearbook?**

To solve the question complete the table of values, and the graph.

Descartes	
Number of Books	Cost
0	
50	
100	
150	
200	
250	
300	
350	
400	
450	
500	

School Memories	
Number of Books	Cost
0	
50	
100	
150	
200	
250	
300	
350	
400	
450	
500	



1. How can the flat fee and the cost per book be used to draw the graph?
2. What is the point of intersection of the two lines? What does it represent?
3. Under what conditions is it best to go with Descartes Publishing?
4. Under what conditions is it best to go with School Memories?

4.1.2: What's My Equation? (Continued)

Problem B:

The school council is trying to determine where to hold the athletic banquet. The Algebra Ballroom charges an \$800 flat fee and \$60 per person. The Geometry Hall charges a \$1000 flat fee and \$55 per person. **Which location should the school council select for the athletic banquet?**

To solve the question, complete the table of values, and the graph.

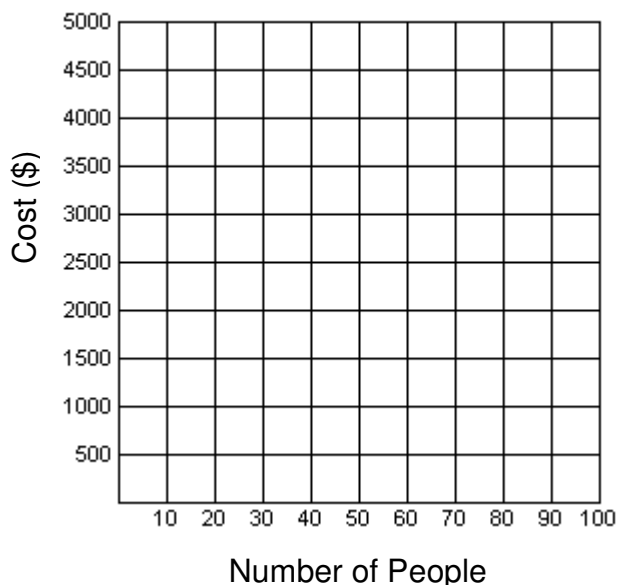
Algebra Ballroom

Number of People	Cost
0	
10	
20	
30	
40	
50	
60	
70	
80	
90	
100	

Geometry Hall

Number of People	Cost
0	
10	
20	
30	
40	
50	
60	
70	
80	
90	
100	

Algebra Ballroom vs. Geometry Hall



1. How can the flat fee and the cost per person be used to draw the graph?
2. What is the point of intersection of the two lines? What does it represent?
3. Under what conditions is it best to go with Algebra Ballroom?
4. Under what conditions is it best to go with Geometry Hall?

4.1.2: What's My Equation? (Continued)

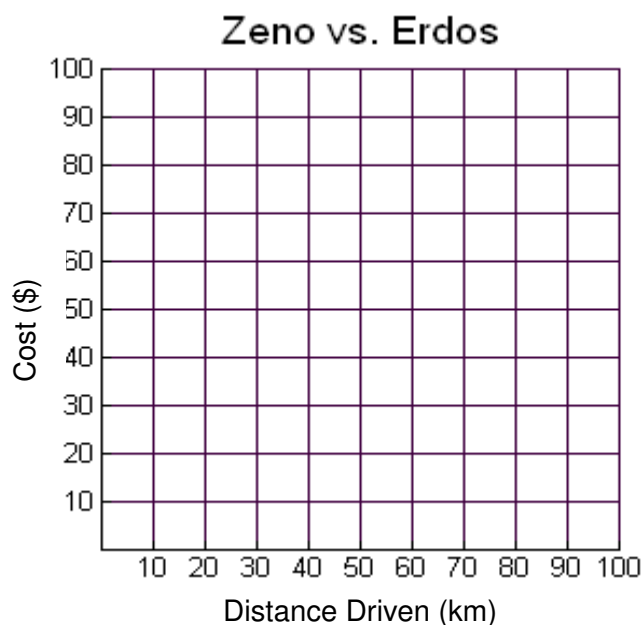
Problem C:

Yasser is renting a car. Zeno Car Rental charges \$45 for the rental of the car and \$0.15 per kilometre driven. Erdos Car Rental charges \$35 for the rental of the same car and \$0.25 per kilometre driven.

Which company should Yasser choose to rent the car from?

To solve the question, complete the table of values, and the graph.

Zeno		Erdos	
Distance (km)	Cost	Distance (km)	Cost
0		0	
10		10	
20		20	
30		30	
40		40	
50		50	
60		60	
70		70	
80		80	
90		90	
100		100	



1. How can the car rental cost and the cost per kilometre be used to draw the graph?
2. What is the point of intersection of the two lines? What does it represent?
3. Under what conditions is it best to rent from Zeno Car Rental?
4. Under what conditions is it best to rent from Erdos Car Rental?

4.1.2: What's My Equation? (Continued)

Problem D:

The school is putting on the play “Algebra: The Musical”. Adult tickets were sold at a cost of \$8 and student tickets were sold at a cost of \$5. A total of 220 tickets were sold to the premiere and a total of \$1460 was collected from ticket sales.

How many adult and student tickets were sold to the premiere of the musical?

To solve the question complete the table of values, and the graph.

Let x represent the number of student tickets sold

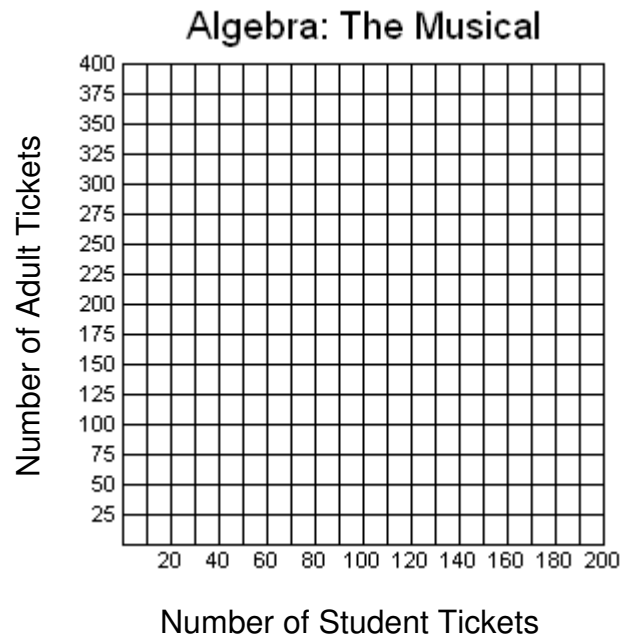
Let y represent the number of adult tickets sold

**Equation 1:
Tickets Sold**

x	y
0	
40	
80	
120	
160	
200	

**Equation 2:
Revenue**

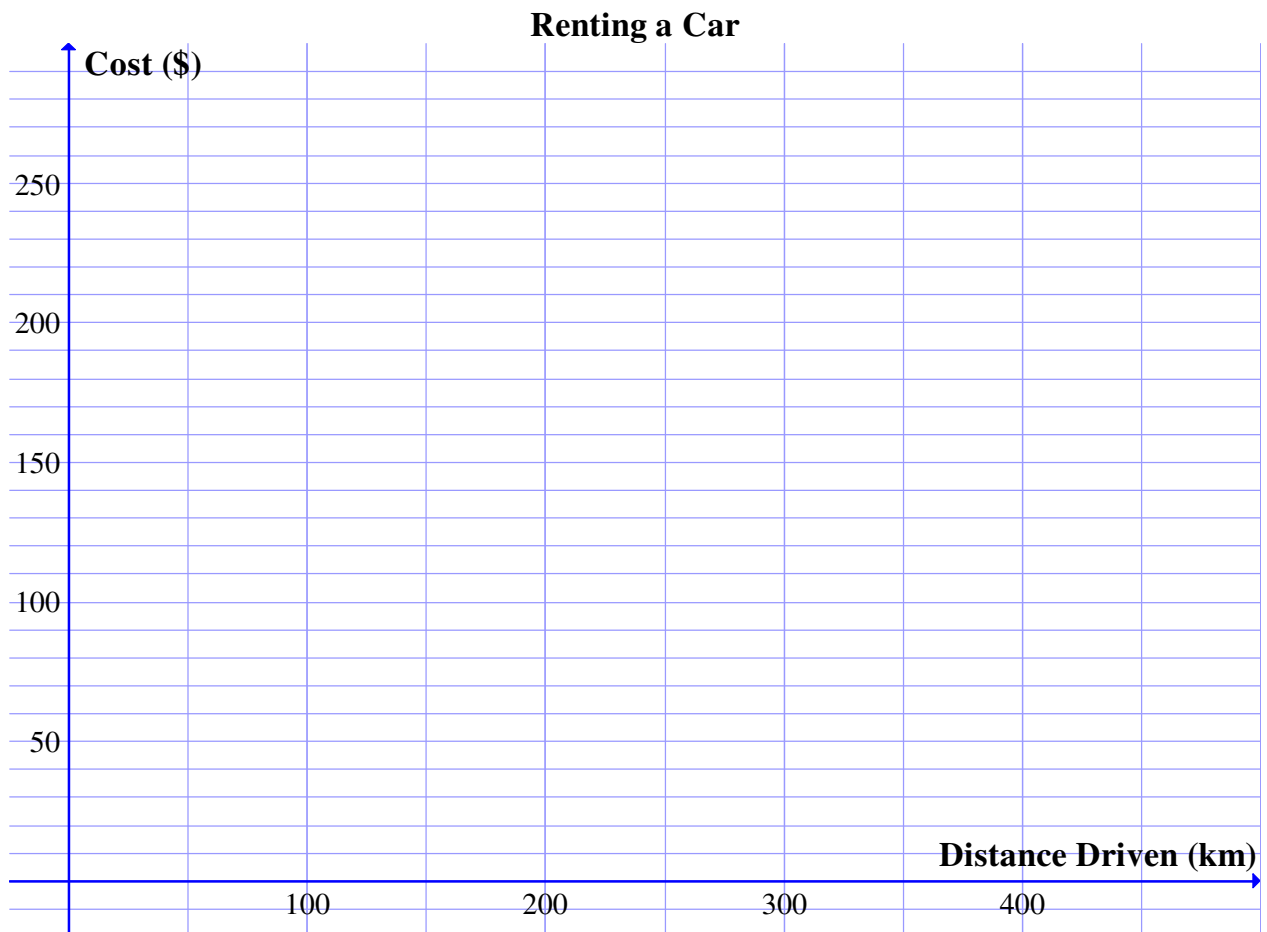
x	y
0	
40	
80	
120	
160	
200	



1. What is the approximate point of intersection of the two lines? What does it represent?
2. Does the rest of the graph (other than the point of intersection) give us any information about the number of tickets sold?

4.1.3: Meaning of the Point of Intersection

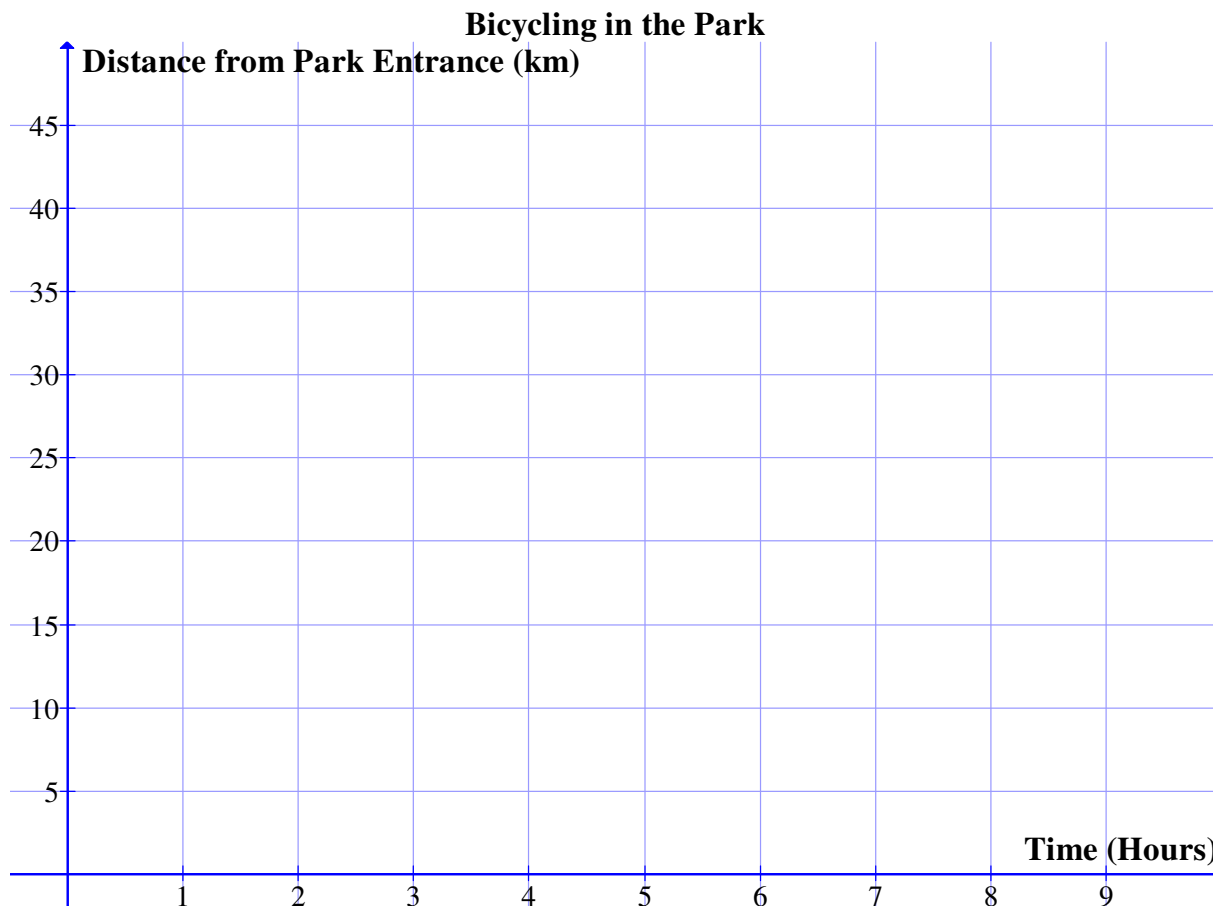
1. Your family wants to rent a car for a weekend trip. **Cars R Us** charges \$60.00 per weekend for a midsize car plus \$0.20 per km. **Travel With Us** charges \$0.50 per km.
 - a) Graph both options on the grid and determine the number of kilometres where both companies will cost the same amount.
 - b) Explain what this means for your weekend trip.



4.1.3: Meaning of the Point of Intersection (Continued)

2. Anthony and Anne are bicycling at a Provincial Park. Anthony travels at the rate of 5 km/hr and begins 20 km from the park entrance. Anne begins at the park entrance and travels at a rate of 10 km/hr. They both travel at a constant rate towards the Outdoor Education Centre.

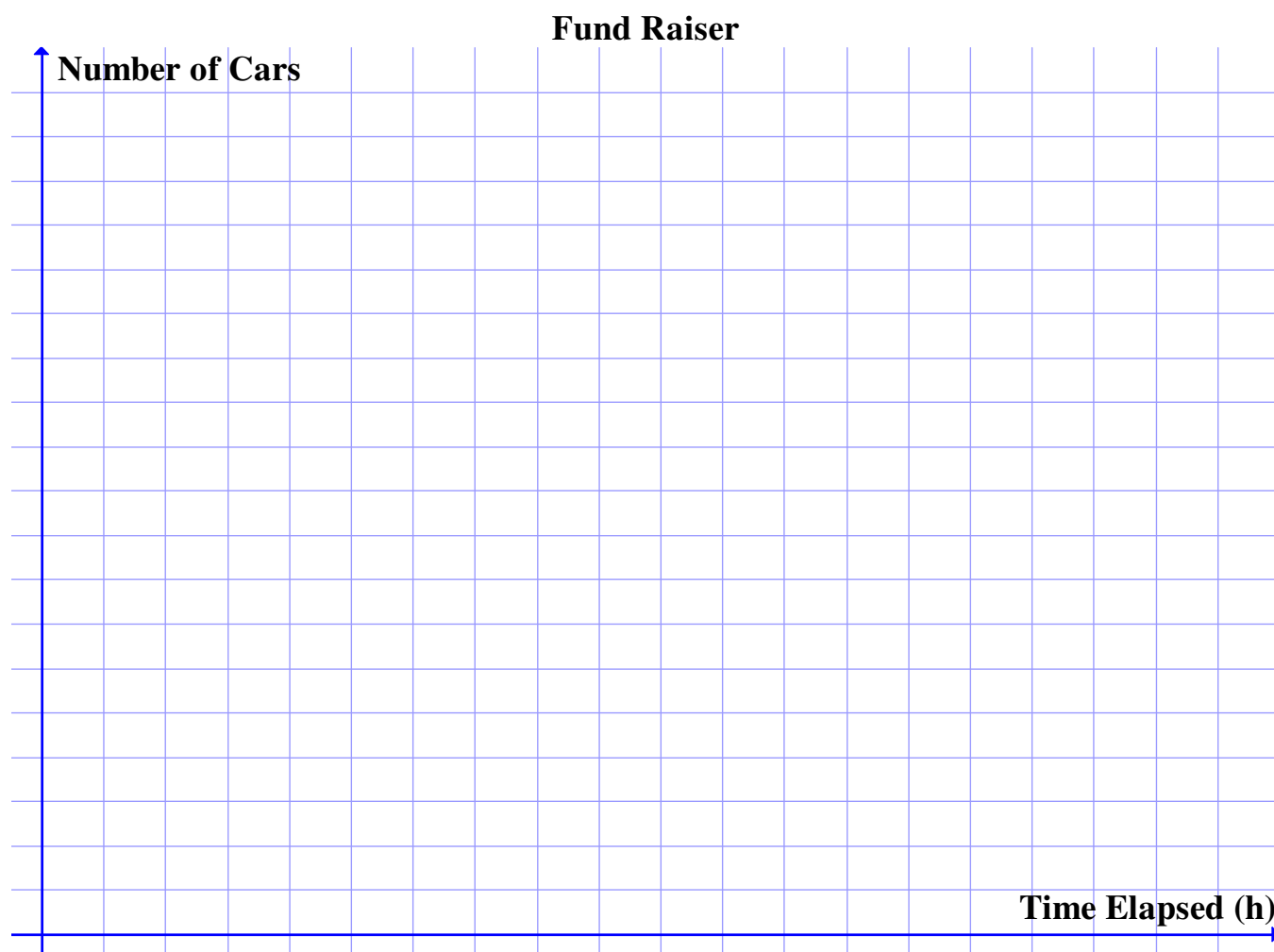
Graph both routes on the grid and determine the meaning of the point of intersection.



4.1.3: Meaning of the Point of Intersection (Continued)

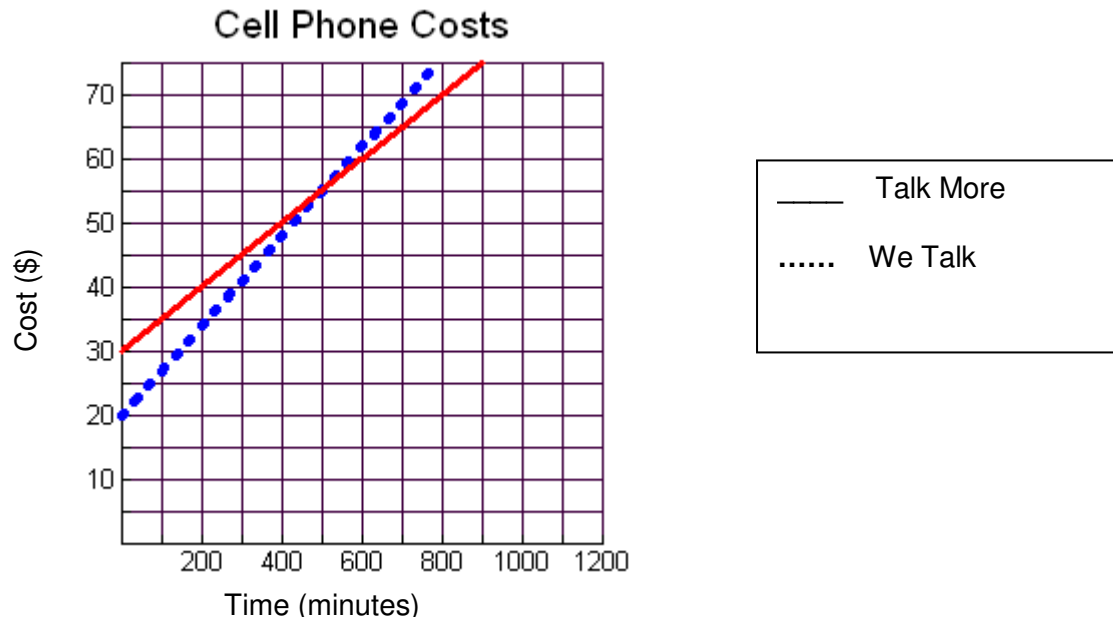
3. For a car wash fundraiser **Team A** washes 2 cars per hour starting at 7:00 a.m.
Team B begins washing cars at 9:00 a.m. and washes 3 cars per hour.

Graph the car washing progress of each team on the grid and determine the meaning of the point of intersection, as well as the meaning of the points before and after the point of intersection.



4.2.1: A Visual Cell Phone Problem

Two cell phone companies charge a monthly flat fee plus an additional cost for each minute of time used. The graph below shows the Time vs. Cost relationship, for one month.



1. What is the Point of Intersection (POI), and what is the meaning of the POI in relation to the cell phone plans?
2. Under what conditions is it best to use the Talk More cell phone plan?
3. Under what conditions is it best to use the We Talk cell phone plan?
4. How does the graph help you to determine which cell phone plan is the most appropriate at any given time?

4.2.2: Music is My Best Friend

iTunes and Music Mine are two online music providers. Each company charges a monthly membership fee and then a per song download rate.

iTunes charges \$10 per month, and \$1 per song

$$C = n + 10$$

Music Mine charges \$7 per month and \$1.50 per song.

$$C = 1.5n + 7$$

Where C represents the total cost for one month and n represents the number of songs purchased.

Create a table of values showing the total charges for up to 8 songs purchased.

Graph the lines on the same graph below.

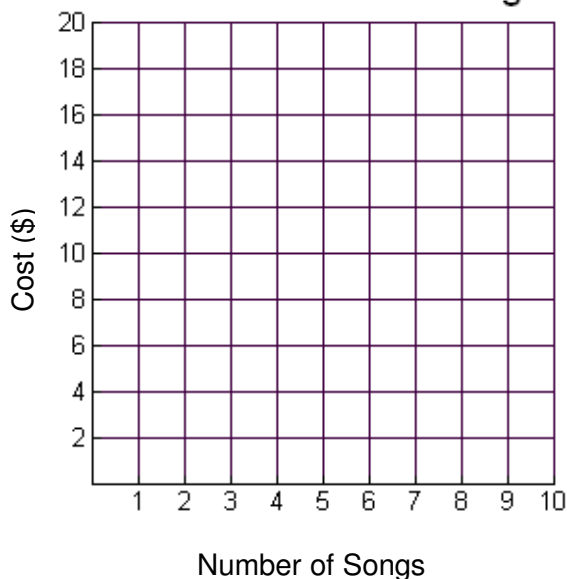
iTunes

n	C
0	
1	

Music Mine

n	C
0	
1	

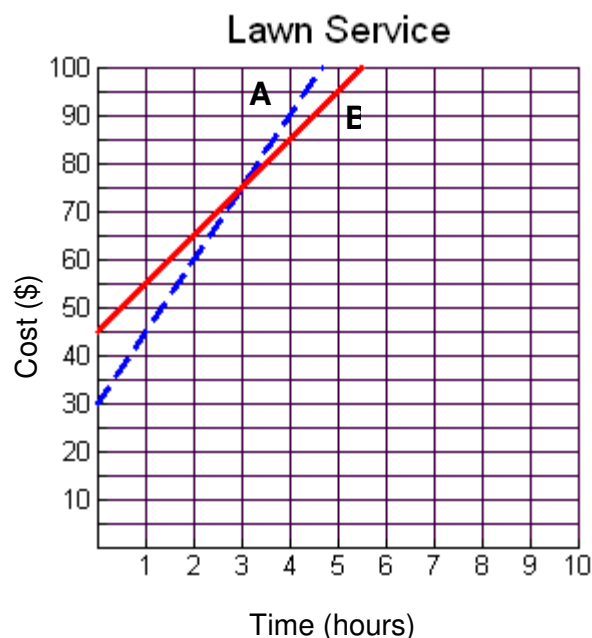
Online Music Purchasing



1. If Lulu plans to purchase 7 songs this month, which is the best plan for her? Explain.
2. Which plan is cheaper if you only plan to buy 4 songs per month? How do you know from the graph?
3. Which cell phone plan would you choose and why? Relate your answer back to the POI.

4.2.3: Where Do We Meet?

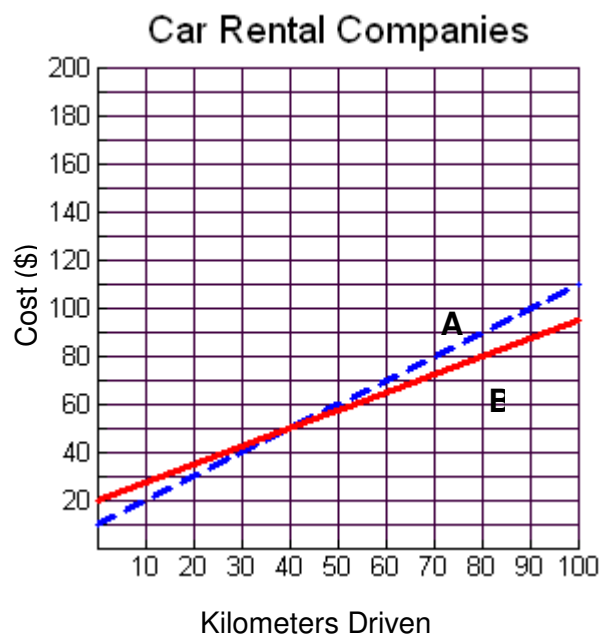
For each of the following situations, find the point of intersection and describe the meaning of this point. Describe which company or service you would choose under what circumstances. A template has been provided for the first situations.



Point of intersection: _____

Interpretation of the point:

If the job lasts less than _____ hours, choose _____. If the job lasts more than _____ hours, choose _____. If the job lasts _____ hours, choose either company and the cost is _____.



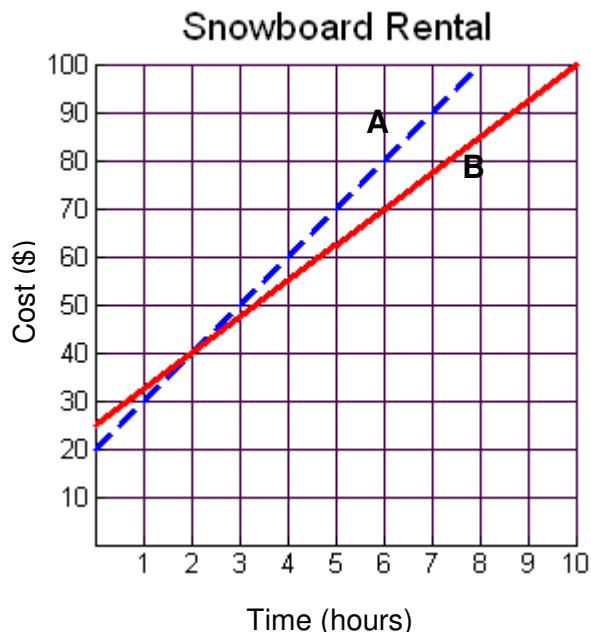
Point of intersection: _____

Interpretation of the point:

If the kilometers driven is less than _____, choose _____. If the kilometers driven is more than _____, choose _____. If the kilometers driven is _____, choose either company and the cost is _____.

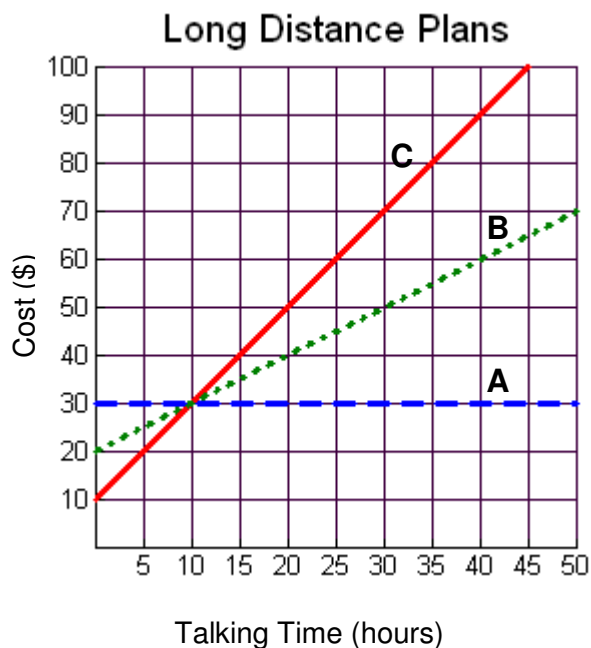
4.2.3: Where Do We Meet? (Continued)

For each of the following situations, find the point of intersection and describe the meaning of this point. Refer back to the template provided for the first situations.



Point of intersection: _____

Interpretation of the point:



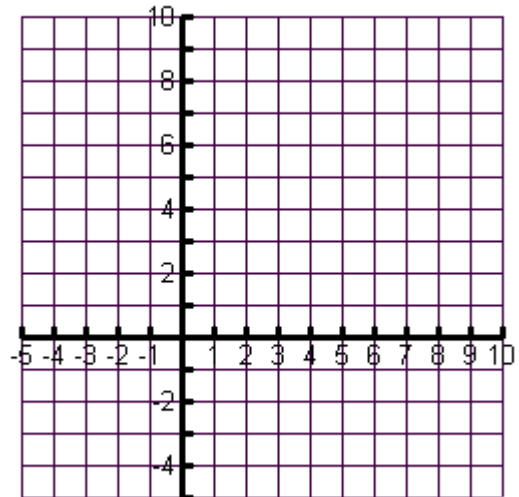
Point of intersection: _____

Interpretation of the point:

4.2.4: Does This Line Cross?

From the list of relations below, determine which lines cross through the point (2,3). You may use the graph to assist you.

1. $y = 2x + 3$
2. $y = x + 1$
3. $y = -2x + 7$
4. $y = -3$
5. $x = 2$
6. $y = 2$



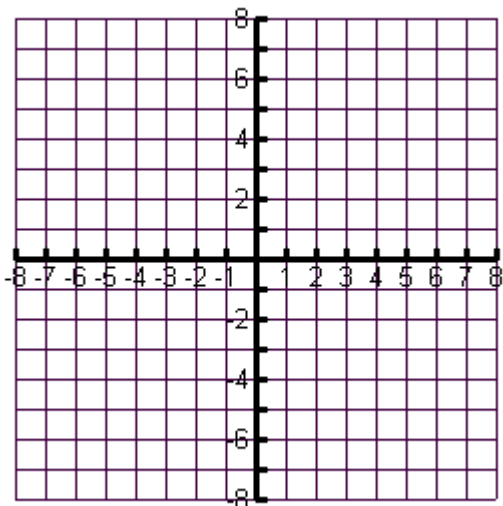
Questions:

1. Which of the lines passes through the point (2, 3)?
2. Is there another way to determine if the line passes through the point, other than graphing? Explain.
3. Without graphing, how can you quickly determine if a horizontal or vertical line passes through a point?
4. Other than the point (2, 3), what are the other points of intersection on your graph?
5. Is it possible for two lines to have more than one point of intersection **with each other**? Discuss this with your partner.

4.2.5: Is this Accurate?

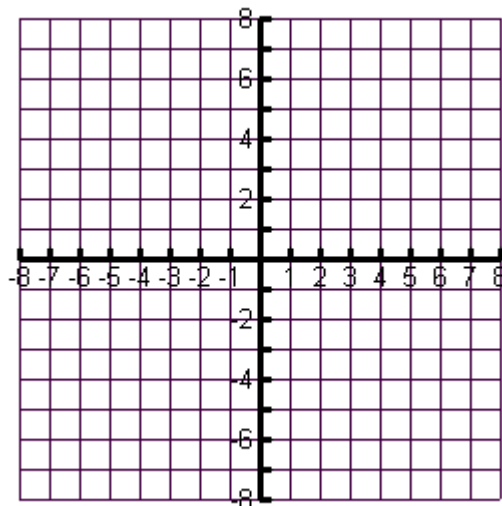
1. Find the point of intersection.

a) $y = 2x + 1$
 $y = 3x - 2$



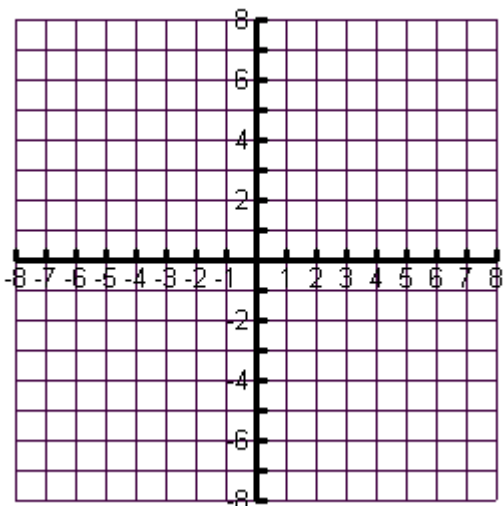
Point of intersection is : _____

b) $y = -x - 2$
 $y = 2x + 7$



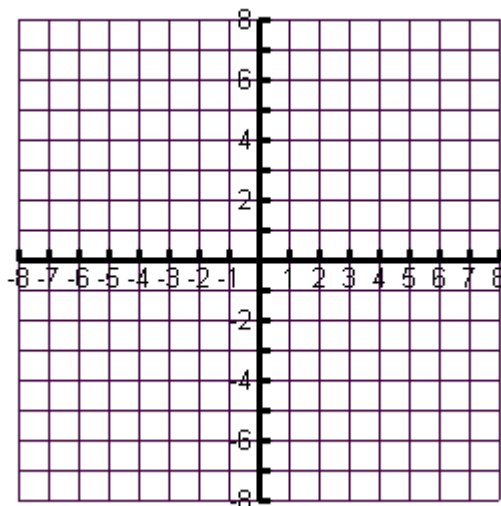
Point of intersection is: _____

c) $y = 2x + 1$
 $y = 4x - 4$



Point of intersection is : _____

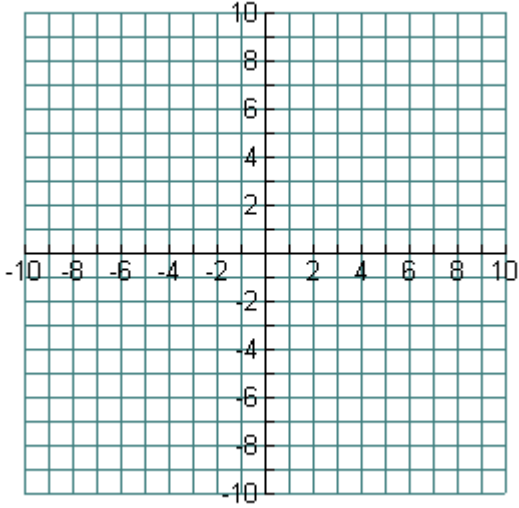
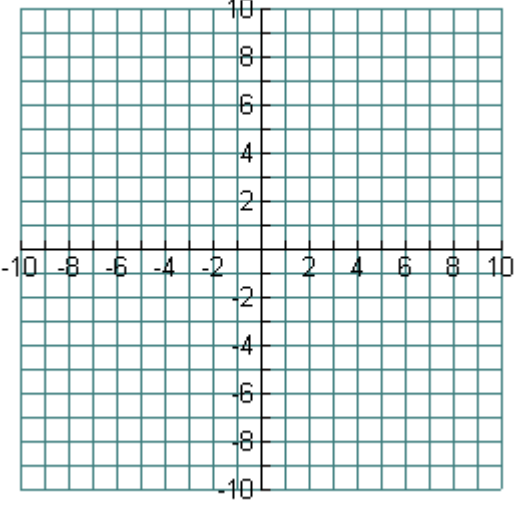
d) $y = -5$
 $y = -3x + 2$



Point of intersection is : _____

4.3.1: What's my POI?

- Each one of you will **solve** one of the systems of equations given below.
- Once you have solved the system you were assigned, **trade** with your partner and **check** their solution. **Share** your feedback with your partner.

System A	System B
$y = \frac{1}{2}x - 1$ $y = -3x + 4$	$y = 2x + 7$ $y = -3x + 4$
	
Point of Intersection: (,)	Point of Intersection: (,)

4.3.2: A Better Way

Solve the following systems of equations **algebraically**.

1. Equation 1: $y + 2 = 10$ and Equation 2: $x + y = 12$

Point of intersection: (____, ____)

2. Equation 1: $3x + 2y = 33$ and Equation 2: $2x = x + 7$

Point of intersection: (____, ____)



4.3.3: Putting the Pieces Together

Solve the following linear systems. Check your solutions using a graphing calculator and compare your solution with someone else in the class.

System 1: $y = 2x + 7$ and $y = -3x + 4$

System 2: $-2x + y = 0$ and $x - y = 12$

4.3.4: The “Sub” Way

- In groups of three, have each person in the group solve one of the systems below.
- Use your graphing calculator to check your solution.
- Share your solutions with each person in the group.

System A	System B
$y = 4x + 24$ and $y = -5x - 12$	$13x + y = -4$ and $5x + y + 4 = 0$
System C	Challenge
$y = -x - 8$ and $y = -5x$	<p>CHALLENGE: Plot each of the POI's from Systems A, B, and C and find the equation of the line that connects the three points.</p> <div> </div> <p>Equation of Line: _____</p>

4.3.5: What's My Equation? - Part 2

Part A

Let's return to our application problems that we solved graphically earlier in the unit. Assign each person in your group one of the three problems to solve. Solve these application problems using the method of substitution introduced today. Use a graphing calculator to check your solution.

Problem A:

The yearbook club is considering two different companies to print the yearbook. The Descartes Publishing Company charges a flat fee of \$450 plus \$5.00 per book. School Memories charges a flat fee of \$700 plus \$4.00 per book. For what amount of books do the two companies charge the same amount?

Equations

$$y = 450 + 5.00x$$

$$y = 700 + 4.00x$$

Problem B:

The school council is trying to determine where to hold the athletic banquet. The Algebra Ballroom charges an \$800 flat fee and \$60 per person. The Geometry Hall charges a \$1000 flat fee and \$55 per person. For what amount of guests do the two banquet halls charge the same amount?

Equations

$$y = 60x + 800$$

$$y = 55x + 1000$$

Problem C:

Yasser is renting a car. Zeno Car Rental charges \$45 for the rental of the car and \$0.15 per kilometre driven. Erdos Car Rental charges \$35 for the rental of the same car and \$0.25 per kilometre driven. For what distance do the rental companies charge the same amount?

Equations

$$y = 45 + 0.15x$$

$$y = 35 + 0.25x$$

I am solving problem ____:

4.3.5: What's My Equation? - Part 2 (Continued)

Part B

Discuss the following questions with your group members.

1. Looking at your problem, how can you tell from the equation which company is cheaper before the point of intersection (where the costs are equal)?
2. Looking at your problem, how can you tell from the equation which company is cheaper after the point of intersection (where the costs are equal)?
3. Is this true for all problems?
4. Now that you've solved the problems using two different methods, which method do you prefer? Why?
5. When do you think solving by substitution would be preferable to solving by graphing?

4.4.1: The Lowdown on Downloads

Let's return to our music downloading problem. Here's the problem again.

iTunes and Music Mine are two online music providers. Each company charges a monthly membership fee and then a per song download rate.

iTunes charges \$10 per month, and \$1 per song

$$C = n + 10$$

Music Mine charges \$7 per month and \$1.50 per song.

$$C = 1.5n + 7$$

1. Find the number of songs that I would need to download where the costs are the same for the two music providers.

2. Paris solved the problem and then made the following conclusion:

If you download less than 6 songs per month then choose iTunes since the cost per song is less. If you download more than 6 songs per month then choose Music Mine since the fixed cost is less. If you download exactly 6 songs per month, choose either

Is the conclusion that Paris made correct? If not, underline the part(s) of her conclusion that are incorrect and then rewrite it so that it is correct.

4.4.3: An Interesting Problem

Consider the following three systems of equations:

System A	System B	System C
$x + 2y = 3$ and $4x + 5y = 6$	$-2x + y = 4$ and $7x + 10y = 13$	$-5x - 3y = -1$ and $x + 3y = 5$

1. In order to solve these systems by substitution, we need to first **isolate one variable in one equation**. Circle the variable in each system that would require just **one** step to isolate. Compare your choice with a neighbour.
2. Isolate the variable you selected in #1 for each system.

System A	System B	System C

3. Assign each system to one person in your group and solve the system assigned to you in the space below. Use your graphing calculator to check.

I am solving system ____:

Point of Intersection (____, ____)

4. Compare your solution to the rest of the group. What do you notice?

4.4.4: The Sub Steps

Solving using the method of substitution requires five steps. The steps are given below in the text boxes. Discuss with your partner what you think the correct order is for the steps and then write the steps in the space provided. Solve the system in the chart as model of solving by substitution. Check using your handheld.

State the point of intersection.

Solve the resulting equation.

Substitute the isolated expression into the other equation.

Substitute your solution into an original equation to solve for the other variable.

Isolate for a variable. The easiest variable to isolate for has a coefficient of 1.

Steps for Solving by Substitution	Example: Solve $4x + y = 6$ and $2x - 3y = 10$

4.5.1: A Trip to Jim Hortons

It's summer vacation. Ah, sweet freedom. The only problem is that you're the designated coffee gopher at the office where you have a summer job. On Monday, you were sent out to Jimmies to pick up five small coffees and seven extra large coffees. You remember that the total cost was \$14.95, including tax. On Tuesday, you were sent out to get three small coffees and seven large coffees. You recall that the total came to \$12.75, with tax.

It's Wednesday morning and your coffee crazy co-workers are calling for their cup o' joe. Unfortunately, since the morning fix hasn't arrived yet, no one can remember how much a small or large coffee costs, including yourself. You need to find out how much each size costs to collect the correct amount of money for the Wednesday coffee run.

1. Let S be the number of small coffees ordered on a single day.

Let L be the number of large coffees ordered on a single day.

As a class, can we decide on an equation to represent the purchases made on Monday, and an equation to represent the purchases made on Tuesday?

Monday's equation: _____

Tuesday's equation: _____

2. Now we have a linear system. Take a few minutes to solve the linear system using substitution in the space below. Then pair with another student to discuss your solution.

3. What problems, if any, did you encounter?

4.5.2: An Elimination Introduction

You know that two integers can be added, or subtracted:

$$\begin{array}{r} 5 \\ + 7 \\ \hline 12 \end{array}$$

$$\begin{array}{r} 15 \\ - 6 \\ \hline 9 \end{array}$$

In the same way, equations can be added, or subtracted:

$$\begin{array}{r} 3x + 2y = 19 \\ + \quad 5x - 2y = 5 \\ \hline 8x \qquad = 24 \end{array}$$

$$\begin{array}{r} 10x + 20y = 80 \\ - \quad 10x + 15y = 25 \\ \hline 5y = 55 \end{array}$$

Notice that by adding the equations in the first linear system, the y variable was eliminated (there were $0y$), which makes it possible to solve for x .

By subtracting the equations in the second linear system, the x variable was eliminated (there were $0x$), which makes it possible to solve for y .

1. Work in pairs to consider the following linear systems. Decide what operation – addition or subtraction – would result in the elimination of a variable.

$$\begin{array}{r} 9x + y = 4 \\ 14x + y = -1 \\ \hline \end{array}$$

$$\begin{array}{r} 3x - y = 50 \\ 12x + y = 115 \\ \hline \end{array}$$

$$\begin{array}{r} -7x - 6y = 338 \\ 9x + 6y = -366 \\ \hline \end{array}$$

$$\begin{array}{r} 18x - 5y = 454 \\ 12x - 5y = 316 \\ \hline \end{array}$$

$$\begin{array}{r} 19x + 2y = 102 \\ 19x - 2y = 50 \\ \hline \end{array}$$

$$\begin{array}{r} 17x - 8y = 323 \\ 6x + 8y = 114 \\ \hline \end{array}$$

$$\begin{array}{r} 9x - 4y = 235 \\ 15x + 2y = 409 \\ \hline \end{array}$$

$$\begin{array}{r} 7x - 16y = 441 \\ 7x - 17y = 476 \\ \hline \end{array}$$

$$\begin{array}{r} 5x - 3y = 188 \\ 6x - 11y = 344 \\ \hline \end{array}$$

2. What needs to be true about a linear system so that a variable is eliminated when the equations are added or subtracted?

4.5.3: Solving a Linear System by Elimination

1. How would you begin solving this linear system? Addition or Subtraction?

$$5x + 4y = 7$$

$$\underline{3x - 4y = 17}$$

2. Solve the system.

3. In your own words, describe what you must do to solve a linear system by elimination.

4.6.1: What's the difference?

Equation 1: $x + 2y = 6$

Multiply the equation by the constant _____. The new equation (Equation 2) is _____.

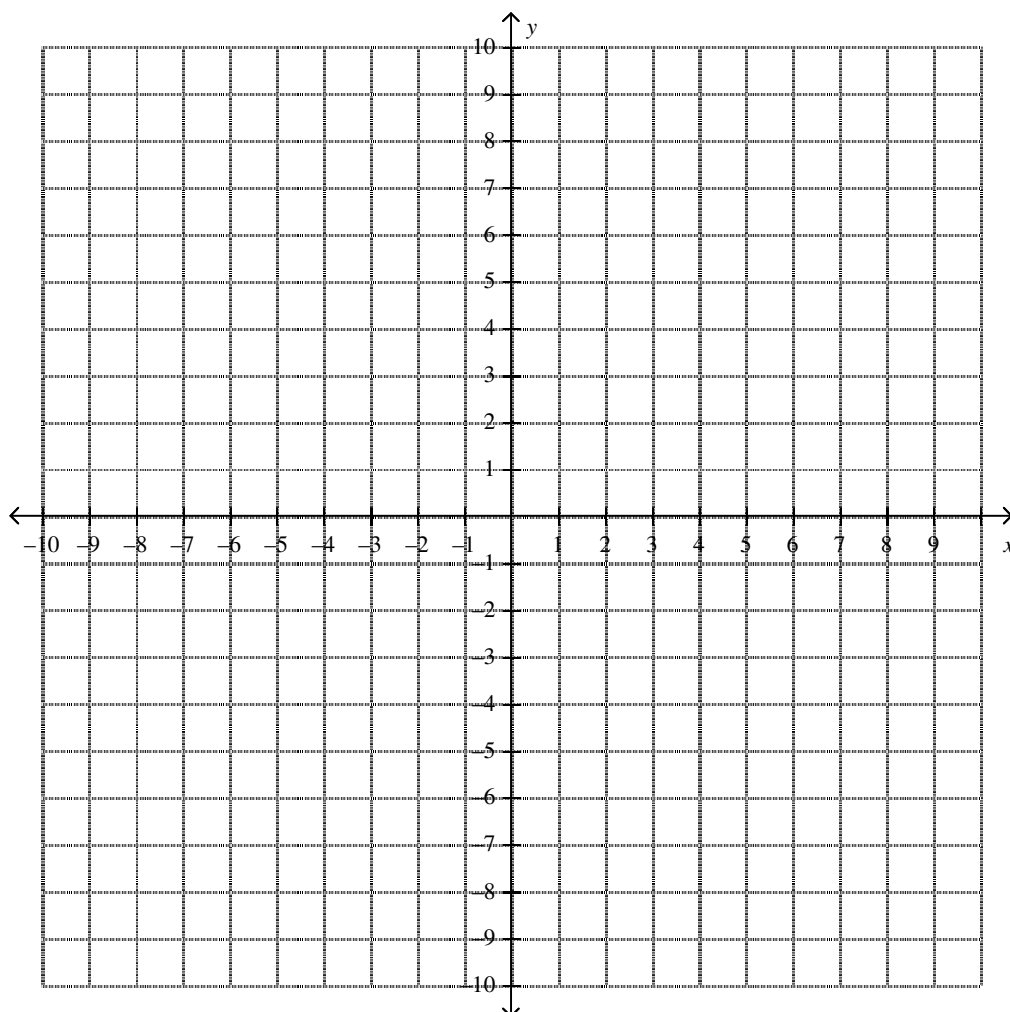
Complete a table of values for each equation and plot the values on the grid provided.

Equation 1:

x	
y	

Equation 2:

x	
y	



What do you notice about the two equations? Do you think this is always the case when multiplying an equation by a constant?

4.6.2: Elimination Preparation

1. Consider the following linear system:

$$3k + 15m = 15$$

$$-k - m = -1$$

If you add or subtract the equations, will a variable be eliminated? Explain.

2. What could be done to create the conditions necessary for elimination?

4.6.3: Algebra, the Musical, Redux

Recall that in the first lesson of this unit, you solved the following problem by graphing:

The school is putting on the play “Algebra: The Musical”. Adult tickets were sold at a cost of \$8 and student tickets were sold at a cost of \$5. A total of 220 tickets were sold to the premiere and a total of \$1460 was collected from ticket sales.

How many adult and student tickets were sold to the premiere of the musical?

If x represents the number of student tickets sold, and y represents the number of adult tickets sold, then the equations that model this problem are:

(from cost of tickets) $5x + 8y = 1460$

(from number of tickets sold) $x + y = 220$

You probably remember that this problem took a while to solve by graphing, and the answer you found was not necessarily very accurate, since you read the point of intersection off of the graph.

You will work with a partner now to solve this problem using the method of elimination.

1. Since you have been asked to eliminate the x or y variable (**circle one**) first, what will be the first step you take to create the conditions necessary for elimination?
2. Solve the linear system now. Use your graphing calculator to help check the solution. Use the space below for rough work.
3. Does it matter which variable is eliminated first? That is, does it change the final answer?
4. Think back to when you solved this problem by graphing. Do you find the method of elimination easier or harder? Explain.

4.6.4: Two for You

Try solving the following questions using the method of elimination. Use your graphing calculator to check your solutions.

1. A fitness club charges an annual fee and an hourly fee. In a single year, member A worked out for 76 hours and paid \$277 in total. Member B worked out for 49 hours and paid \$223 in total. What is the annual fee? What is the hourly fee?

HINT: Start by writing “let” statements to define the variables you will use. For example:

Let ***a*** represent the amount of the annual fee.

Let ***h*** represent the amount of the hourly fee.

2. This past summer, you ran a food booth at a local festival. You sold hotdogs for \$1 each and samosas for \$2.50 each. From 205 purchases, you made \$400 in total. To help plan purchases for next year’s festival, you’d like to know how many hotdogs and samosas were sold. Unfortunately, you forgot to keep track of this when selling the food. Can you determine how many hotdogs and samosas were sold?

NOTE: Assume one hotdog **or** one samosa per purchase.

4.6.5: Help an Absent Friend

Consider the following linear system:

$$2x + 3y = 1$$

$$3x - y = 7$$

How would you solve it? Write in words a description of the steps you would take.

To help you understand what to write, pretend for a moment that you are writing the instructions for a friend who is not in class today. What steps would you need to describe?

4.6.6: “Here’s To The Crazy Ones”

1. Solve the following linear system by elimination:

$$4x + 2y = 12$$

$$8x + 4y = 32$$

2. Did you encounter any results that are unusual? Explain what is different compared to questions you have already solved.

3. Re-arrange each equation from the linear system into $y = mx + b$ form, then graph.

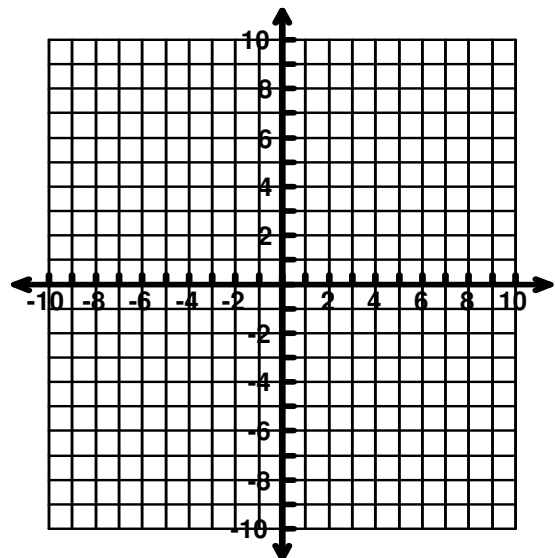
For example, here is how the first equation can be re-arranged:

$$4x + 2y = 12$$

$$2y = -4x + 12$$

$$\frac{2y}{2} = \frac{-4x}{2} + \frac{12}{2}$$

$$y = -2x + 6$$



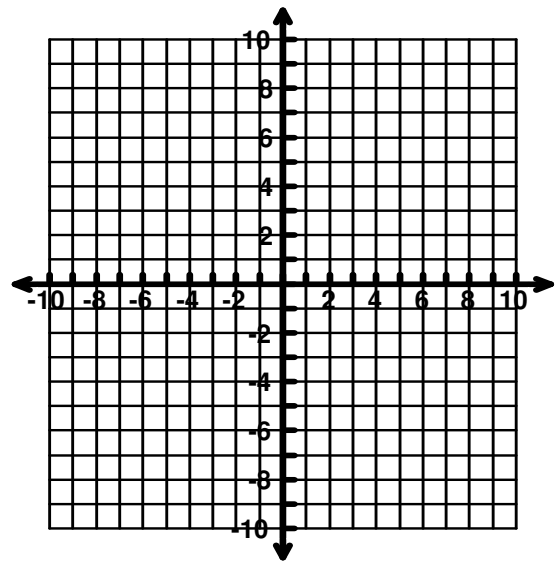
4. What do you notice about the slope in each equation that you re-arranged? What do you notice about how the two lines visually relate to each other? Is there a solution to this linear system?

4.6.6: “Here’s To The Crazy Ones” (Continued)

5. Solve the following linear system by elimination:

$$\begin{aligned}6x + 2y &= 2 \\12x + 4y &= 4\end{aligned}$$

6. Did you encounter any results that are unusual? Explain what is different compared to questions you have already solved.
7. Re-arrange each equation from the linear system into $y = mx + b$ form, then graph.



8. What do you notice about the slope and y-intercept in each equation that you re-arranged? What do you notice about how the two lines visually relate to each other? Is there a solution to this linear system? If so, how many?

4.7.1: Which Method?

For each system of linear equations below, decide which method (graphing, substitution or elimination) would be the most efficient method for you to use. Justify your choice, and then solve the problem using your chosen method.

System A:

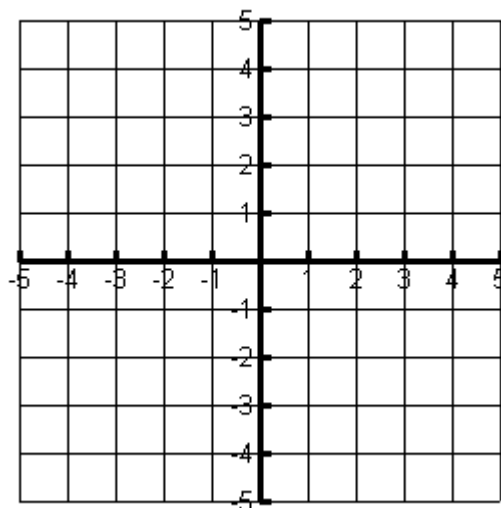
$$2x + 3y = 10$$

$$-4x + 5y = 2$$

Chosen Method:

Justification:

Solution:



4.7.1: Which Method? (continued)

Decide which method (graphing, substitution or elimination) would be the most efficient method for you to use to solve this system. Justify your choice, and then solve the problem using your chosen method.

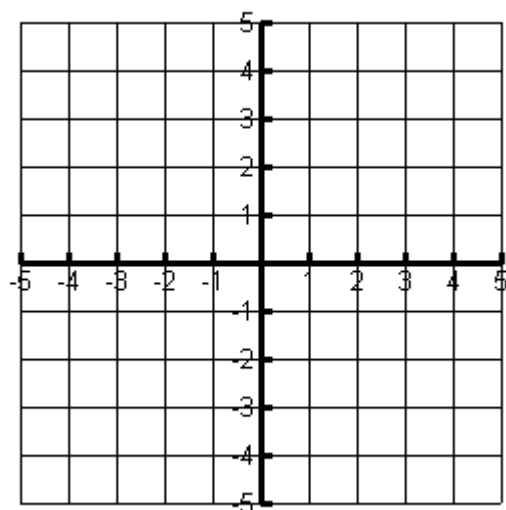
System B:

$$y = x - 2$$
$$x + 5y = -4$$

Chosen Method:

Justification:

Solution:



4.7.1: Which Method? (continued)

Decide which method (graphing, substitution or elimination) would be the most efficient method for you to use to solve this system. Justify your choice, and then solve the problem using your chosen method.

System C:

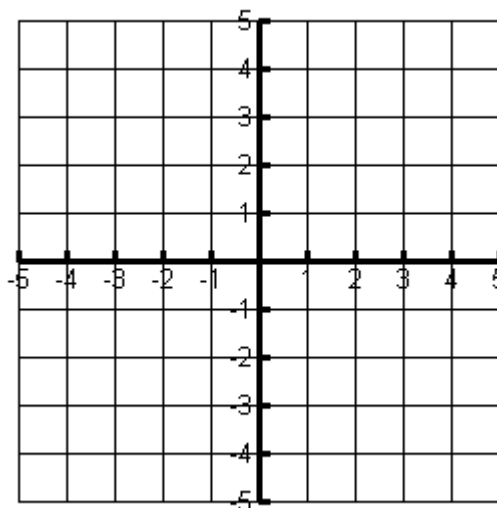
$$y = 2x - 7$$

$$y = -4x - 5$$

Chosen Method:

Justification:

Solution:



4.7.2: 3 Ways

Problem #1: Two catering companies provide food and the banquet hall for weddings, proms and anniversaries. Nick and Heather are getting married in September and they have two catering companies to choose from:

Cookie's Catering	Frugal Gourmet
Caesar Salad	Minestrone Soup
Chicken Picatta	Mixed green salad
Roasted Potatoes	Prime Rib
Steamed Potatoes	Garlic Mashed Potatoes
Vegetables	Asparagus
Sherbet	Apple Pie
Coffee or Tea	Coffee or Tea

The cost(C) for the different menu options includes the cost of the hall rental and price per person (n).

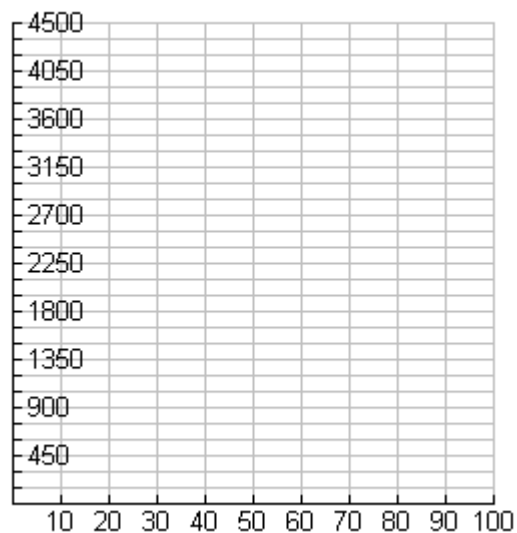
Cookie's Catering: $C = 40n + 500$

Frugal Gourmet: $C = 45n + 350$

Cookie's Catering

Frugal Gourmet

Solve the system using the graphing method:



Point of intersection: _____

4.7.2: 3 Ways (Continued)

Solve the system using substitution

Solve the system using elimination

Point of intersection: _____

Point of intersection: _____

What does the point of intersection mean in this catering problem?

You used 3 different methods to solve the system. What did you notice about the points of intersection? Does this surprise you?

Nick and Heather have invited 80 people to their wedding. How much will it cost for each menu?

Heather prefers the Frugal Gourmet menu to Cookie's Catering. How much more will she pay for her preference?

4.7.2: 3 Ways (Continued)

Problem #2: The student council is providing lunch and music for the grade 10 class. They have two quotes from Lunch Express and Let's Do Lunch. The costs for each were given as follows:

Lunch Express: If 100 students attend, it will cost \$1000. If 200 students attend, it will cost \$1500.

Let's Do Lunch: If 50 students attend, it will cost \$700. If 150 students attend, it will cost \$1350.

Which company should they choose? Under what conditions should they choose Lunch Express? Under what conditions should they choose Let's Do Lunch?

Write an equation for Lunch Express (in $y = mx + b$ form):

If 100 students attend, it will cost \$1000. If 200 students attend, it will cost \$1500.
[hint: how can you find the slope? how can you find the y-intercept?]

Write an equation for Let's Do Lunch (in $y = mx + b$ form):

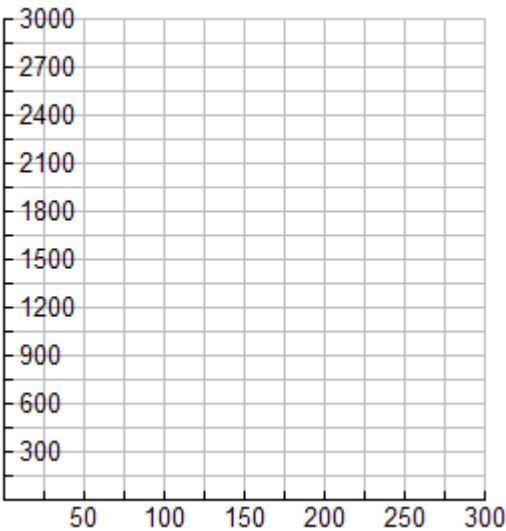
If 50 students attend, it will cost \$700. If 150 students attend, it will cost \$1350.
[hint: how can you find the slope? how can you find the y-intercept?]

4.7.2: 3 Ways (Continued)

Table of Values

Lunch Express		Let's Do Lunch	

Graphing Method



Solve the system using substitution

Point of intersection: _____
Solve the system using elimination

Point of intersection: _____

Point of intersection: _____

4.7.2: 3 Ways (Continued)

Which method do you prefer for solving this linear system?

The student council has \$1800 in their budget for the lunch. They prefer **Let's Do Lunch**, what is the greatest number of grade 10 students they can have at the lunch?

What does the ordered pair (25,750) mean on the **Lunch Express** line?